DOCUMENT RESUME

ED 166 253 TM 008 310

TITLE	Second-Year Findings, with Special Emphasis on Cognitive Outcomes: Evaluation of the New York State Experimental Prekindergarten Program.
INSTITUTION	New York State Education Dept., Albany. Div. of Research.
PUB DATE	31 Oct 78
NOTE	63p.; For related documents, see ED 151 369, 399, 400, 401, and 406
AVAILABLE FROM	Prekindergarten Evaluation Unit, State Education Department, Albany, New York 12234 (no charge)
EDRS PRICE	MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS	Analysis of Covariance; *Cognitive Development; Cognitive Tests; Early Childhood Education; Kindergarten; *Longitudinal Studies; Parental Background; *Preschool Programs; Preschool Tests; *Program Evaluation; Socioeconomic Background
IDENTIFIERS	*New York Experimental Prekindergarten Program

ABSTRACT

In 1975 a longitudinal study was begun to determine the impact of the New York State Experimental Prekindergarten Program on the children's cognitive development. The program enrolls approximately 6,500 children annually. Three cognitive measures were used to evaluate program effects: the Walker Readiness Test for Disadvantaged Children, the Cooperative Preschool Inventory, and the Peabody Picture Vocabulary Test. First-year results indicated that the program had a positive effect on children's performance on the Walker and the Peabody. During the second year, children were studied in kindergarten and in prekindergarten. Results indicate that: (1) the positive effects of the program were still evident on the Walker and the Cooperative at the beginning of kindergarten; (2) effects on the Walker persisted at least until the end of kindergarten; (3) the program was most effective for children whose mothers have the least education and perhaps for children whose families have the lowest income; and (4) the program had a positive effect on the performance of a second wave of children on all three measures administered at the end of prekindergarten. (Author/CTM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED166253

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SECOND-YEAR FINDINGS,

WITH SPECIAL EMPHASIS ON COGNITIVE OUTCOMES:

EVALUATION OF THE

NEW YORK STATE EXPERIMENTAL PREKINDERGARTEN PROGRAM

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

David J. Irvine

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Division of Research
Prekindergarten Evaluation Unit
Albany, New York 12234

October 31, 1978

TM008 310

PREKINDERGARTEN EVALUATION STAFF

David J. Irvine, Coordinator
David L. Flint
Thomas L. Hick
Mary D. Horan
Susan E. Kukuk (part time)
Edward Fallon (part time)

This document has been submitted to the Educational Resources Information Center (ERIC) system for inclusion in that National database. Information regarding the availability of this document in ERIC microfiche format may be obtained from Educational Programs and Studies Information Service, Room 330, New York State Education Department, Albany, New York 12234 or the producing unit.

FOREWORD

This report describes activities of the second year of the longitudinal evaluation of the New York State Experimental Prekindergarten Program, with an emphasis on cognitive outcomes. It focuses on the results of measures administered during the 1976-77 school year. It also includes a summary report on the Indepth Study component, which emphasizes the study and documentation of children's development through activities in seven districts.

The activities which were required to produce the results described here span two years: They include the collection of data during 1976-77; and they include compiling data, preparing data for analysis, and analyzing data during 1977-78. These latter activities took place while the data in the third year of the study were being collected. With the overlap of activities and the growing file of data, the prekindergarten evaluation project is becoming larger and more complex each year.

The report contains descriptions of the major activities and results of the second year of the study. While it is intended to be complete in itself, two additional sets of materials have been prepared:

1. A short summary of the major findings, which can be duplicated and used to communicate results of the study to school boards, staff members, parents, and the general public.

2. A series of technical reports, which are intended to make data available to researchers who are involved in similar studies or who would like to critique our work. The technical reports are listed in the Table of Contents.

The summary will routinely accompany the main report. The technical reports are available on request.

The evaluation of the Experimental Prekindergarten Program encompasses a number of activities. The activities related to the collection and analysis of statistical data are the primary responsibility of the Prekindergarten Evaluation Unit. The Indepth Study, with its component activities of observing and documenting individual children's growth and development, is being carried out by the Bureau of Child Development and Parent Education.

Information about either aspect of the study can be obtained by contacting the responsible unit.

TABLE OF CONTENTS

	Page
FOREWORD	iii
BACKGROUND OF THE STUDY	1
THE SUBJECTS	2
THE DATA	5
SUMMARY OF FIRST-YEAR FINDINGS	7
METHOD OF ANALYSIS: KINDERGARTEN	12
WAVE I RESULTS: BEGINNING OF KINDERGARTEN	13
WAVE I RESULTS: END OF KINDERGARTEN	25
WAVE II RESULTS	34
THE INDEPTH STUDY	47
SUMMARY AND CONCLUSIONS	52
NEXT STEPS	53
REFERENCES	55

Available on Request

TECHNICAL REPORTS

A. WAVE I RESULTS--BEGINNING OF KINDERGARTEN

B. WAVE I RESULTS--END OF KINDERGARTEN

C. CHARACTERISTICS OF WAVE II CHILDREN

D. WAVE II RESULTS

E. REPORT OF THE INDEPTH STUDY OF EXPERIMENTAL PREKINDERGARTEN PROGRAM

BACKGROUND OF THE STUDY

The New York State Experimental Prekindergarten Program operates in 49 local school districts and three Boards of Cooperative Educational Services. Each year the program enrolls approximately 6,500 children of which about 5,000 are four year olds.

In 1975-76 a longitudinal evaluation was begun to study effects of the prekindergarten program on the development of children while they are enrolled in the program and during the kindergarten and primary school years.

Questions to be Answered

The original plan for evaluating the Experimental Prekindergarten Program (1) asked three questions about the effects of the program:

1. Do prekindergarten programs have a measurable effect upon children's cognitive and noncognitive development between the time they enter and leave the program?

2. Do prekindergarten children possess measurable advantages in cognitive development over non-prekindergarten children at the time of entry to kindergarten?

3. Does prekindergarten experience have a measurable effect on children's cognitive development up through the time they complete the third grade?

The plan also contained three questions related to identifying program variables which may influence the development of children:

4. Are there specific variations in prekindergarten programs which result in significantly different levels of cognitive and other development in their students?

5. Can program components or variations be identified which contribute to greater success of particular programs in producing lasting increases in the level of cognitive and other development?

6. Will the systematic collection and analysis of data, carried out in examining the previous questions, provide a baseline for decision makers in studying staff, schedules, objectives, materials, child and parent characteristics, and children's mental ability and cognitive development?

A variety of data describing test performance, personal traits, and program variables are being collected to answer these questions. In addition, an indepth study was undertaken with seven of the local school districts to improve teachers' capabilities for observing and recording children's activities, to identify program factors which account for children's performance, and to provide greater continuity of program from prekindergarten through the third grade. This report describes these activities and presents results from the second year of the study.

First-year results have been described in previous reports (2, 3, 4). In addition, supporting activities have been documented in technical papers (5, 6).

THE SUBJECTS

During the second year of the evaluation (1976-77), two waves of children were studied. Each wave consisted of an experimental group, made up of children who were or had been enrolled in the Experimental Prekindergarten program, and one or two control groups, made up of children who were not enrolled in the program. The various groups are described in the following sections.

Wave I

The experimental group in Wave I was a sample of children who had been enrolled in the Experimental Prekindergarten program during 1975-76 and were enrolled in kindergarten during 1976-77. All four-year-old children were tested at the beginning of prekindergarten. At each subsequent testing, the children tested were sampled by testing all children in that original group in seven "indepth" districts and approximately 26 percent of the original children in the remaining "non-indepth" districts. In each non-indepth district, children who were selected for the sample but became unavailable for testing, usually because they had left the district, were replaced randomly from the remaining children in the original group within the same district. The number of children in the experimental group in the spring of 1977 was 1,717.

Two control groups were established for Wave I. The first group was called waiting-list control group and was made up of children in eight districts participating in the prekindergarten program. These children were identified as being eligible for the program but were not enrolled, usually because of lack of space in the program. Being a member of the control group did not interfere with a child's entering the program if space became available; the child was enrolled in the program and dropped as a control child. In the spring of 1977 there were 64 children in the waiting-list control group for Wave I.

Although the waiting-list control group was large enough to use in most statistical analyses, two factors made it desirable to obtain a larger control group: (1) the difference in size between the waiting-list control group and

the experimental group; and (2) the likelihood that the waiting-list control group would become smaller due to movement of some of the children out of their original districts over the five-year duration of the evaluation study. For these reasons, a second control group was obtained from districts not participating in the prekindergarten program. It was called other-district control group. This group was selected at the time the children in the experimental group were entering kindergarten. (Obtaining an other-district control group during the prekindergarten year was not feasible because school districts have limited access to children before they enter kindergarten.)

An attempt was made to select districts for the other-district control group which resembled prekindergarten districts in size and socioeconomic level. Restrictions in the availability of comparable districts and reluctance of a number of districts to participate made the match between control districts and the prekindergarten districts inexact. Within control districts, children were selected according to the criteria used in admitting children to the prekindergarten program. Procedures used in selecting control districts and children within the districts have been described in a technical paper (7). Eight districts participated and tested 490 kindergarten children for the Wave I other-district control group during 1976-77.

Wave II

The experimental group in Wave II was a sample of children who were enrolled in the prekindergarten program during 1976-77. Selection procedures were similar to those described above. The number of children in the Wave II experimental group in the spring of 1977 was 1,890.

A waiting-list control group was obtained for Wave II following procedures described under Wave I. Fifty-seven children made up this group in the spring of 1977.

THE DATA

Data were collected on the children's cognitive functioning, their personal and family characteristics, their behavior in school and other social situations, and the programs they attended.

Cognitive Measures

The Cooperative Preschool Inventory was chosen because it was developed to measure achievement in areas regarded as necessary for success in school. The test was originally constructed to evaluate the first Head Start programs. Standardization of the revised edition took place in 11 Head Start centers.

The test contains 64 items which measure the child's knowledge about his personal world, ability to interact with another person, vocabulary, numerical concepts, awareness of the physical properties of common objects, and ability to execute certain visual-motor tasks.

The Walker Readiness Test is a 50-item, non-verbal measure of general reasoning. It was designed for use with low socioeconomic children and was normed on a sample of approximately 12,000 Head Start children.

The test is divided into four parts and yields separate scores for Similarities, Differences, Numerical Analogies, and Missing Parts. A total score is also obtained.

The Peabody Picture Vocabulary Test is a measure of the ability to respond to verbal concepts presented orally. The child is shown a set of four pictures as the examiner says a stimulus word. The child is instructed to select the picture which is associated with the stimulus word.

The test has received wide use since it was first published in 1959. The original standardization was carried out on 4,012 cases. The test yields Mental Age and I.Q. scores; however for purposes of the present study, the raw scores were used in the analysis of data.

The test contains 150 items and can be used with persons ranging in age from two years, six months to eighteen years. However, an individual child is administered a much smaller number of items, depending on the number and sequence of correct and incorrect responses.

Personal and Family Characteristics

Data were collected on a number of characteristics of the children and their families. These are reported in detail in Technical Report C.

Additional Data

Data collected on the children's behavior in school and other social situations have been described in part in other reports (8, 9) and will be the subject of additional analyses.

The impact of such program factors as variations in schedule, parental involvement in the program, and noninstructional services will also be the subjects of future analyses.

SUMMARY OF FIRST-YEAR FINDINGS

During 1975-76, data were collected on the prekindergarten children and on the children in the waiting-list control group. A series of analyses was carried out to determine effects of prekindergarten on children, to identify program variables which affect performance of children, and to obtain a clearer picture of what is measured by the various instruments.

Effects of Prekindergarten on the Cognitive Development of Children

Effects of the prekindergarten program on the cognitive development of children were determined by comparing the prekindergarten posttest scores of the experimental group, sampled from four-year-old prekindergarten children, and the waiting-list control group on the Walker, the Cooperative, and the Peabody. Analysis of covariance was used to determine differences between the two groups on the three cognitive measures while taking into account differences between the groups in: (1) time between pretesting and posttesting; (2) mother's education; (3) child's age; (4) family income; and (5) pretest score.

The prekindergarten program positively affected cognitive development, as measured by both the Walker and the Cooperative. On the Walker, the experimental group scored 5.1 points higher than the waiting-list control group on the posttest, even though the experimental group had scored lower on the pretest. When pretest scores were considered, the difference between the experimental and the control group was 6.5 points. Both of these differences are statistically significant. The level of education of the children's mother affected the amount the children benefited from the prekindergarten program,

as measured by the Walker. It was found that, among children whose mothers had the least education, prekindergarten children greatly exceeded control-group children on the Walker posttest; however, the difference between the two groups was much smaller for children whose mothers had the most education. This suggests that the Experimental Prekindergarten Program is especially successful in overcoming deficits of children coming from homes which are lacking in some of the educational advantages thought to be important in preparing children for school.

As in the case of the Walker, the waiting-list control group had higher scores than the experimental group on the Cooperative pretest. However, the experimental group scored 4.8 points higher on the posttest. When pretest scores were considered, the difference between the two groups on the posttest was 6.2 points. The other four variables used in assessing the differences between the two groups had less effect or no effect.

On the Peabody, the pretest scores of the waiting-list control group were higher than those obtained by the experimental group. In spite of this initial advantage the two groups scored at about the same level on the posttest. When the pretest was considered, the difference between the groups on the posttest favored the experimental group by 2.6 points, but this difference is not statistically significant. An effect was identified which varied with the number of months between the pretest and posttest. For children who had only four months between the pretest and posttest the control group performed better than the experimental group on the Peabody posttest by about 8 points. However, for children who had six months between pretest and posttest, the experimental group scored about 6 points above the control group.

In summary, attending prekindergarten had a highly significant effect on the development of children, as measured by the Walker and the Cooperative. The effects of the prekindergarten program were found regardless of how old the child was when he was pretested, how much time elapsed between pretest and posttest, how much the child's family earned, or how well the child scored on the pretest. On the Cooperative, the effect of prekindergarten was also apparent regardless of how much education the mother had; on the Walker, however, the prekindergarten effect was greater for children whose mothers had less education. The prekindergarten program did not have a significant overall effect on the Peabody; the length of time between the pretest and posttest seems to have an influence on performance on the Peabody (10).

Effects of Prekindergarten on the Social Competency of Children

The California was used to measure skills, knowledge, and attitudes which the authors judged to be important for success in school and which they describe as social competency. The waiting-list control group could not be rated on the California because that instrument is designed for observations in a school setting and the control-group children were not in school during 1975-76. Therefore, another strategy had to be used to assess the impact of prekindergarten on California ratings. The strategy adopted was to determine whether differences in the amount of time children are exposed to the prekindergarten program are accompanied by differences in California ratings made near the end of the school year.

Analysis of the data showed that children with more exposure to PreK tended to receive higher ratings on the California. The effect was strongest

up to about 600 hours of exposure. Beyond that point, there was a diminishing effect of exposure on ratings on the California. The exposure effect appeared regardless of the child's age and mother's education.

Thus, the evidence of this study supports the conclusion that attending the Experimental Prekindergarten Program has a positive effect on the social competency of children, as measured by the California. A more detailed discussion of the analysis and results is presented in a technical paper (11).

Effects of Parents' Involvement on the Cognitive Development of Children

Of great importance in planning the nature of an educational program is an assessment of the impact of various program components. A beginning was made in this aspect of program evaluation with study of effects of parents' involvement on Walker posttest scores. It was found that children whose parents participated most in the program tended to score highest on the Walker. This relationship held regardless of the amount of education the mother had.

Factor Analyses of Prekindergarten Data

The large number of variables included in the background information, measures, and program data indicated that the data should be simplified and put into a coherent framework. Factor analysis was selected as the most appropriate tool for this purpose.

Through factor analysis, 37 variables were reduced to 10 factors, indicating that the data describe at least 10 dimensions of children's characteristics. The Walker and Cooperative appear to measure substantially different aspects of cognitive development. The Peabody and Cooperative overlap somewhat

but not so much that they could be considered redundant; the Peabody will be used throughout the five years of the study and will pick up a portion of the domain measured by the Cooperative, which will not be used beyond kindergarten.

The two behavioral measures, the California and the Classroom Behavior Scale, appeared to measure at least two domains which cut across the two instruments. To explore these results, factor analyses of items on the two measures were carried out. The California, which provides only a single overall score, appears to measure five aspects of development rather than one; the five factor scores will be useful in future analyses of the effects of the prekindergarten program. The three scales of the Classroom Behavior Inventory were corroborated in the factor analysis of items on that instrument.

A more detailed discussion of the analyses and results is contained in a technical paper (12).

METHOD OF ANALYSIS: KINDERGARTEN

Three measures of cognitive development were used to assess the effects of prekindergarten (PreK) experience on the performance of children in kindergarten. The measures were the Walker Readiness Test, the Cooperative Preschool Inventory, and the Peabody Picture Vocabulary Test.

The instruments were administered near the beginning and again near the end of kindergarten to three groups of children: (1) an experimental group, made up of children who had been enrolled in the Experimental Prekindergarten Program the previous year; (2) a waiting-list control group, made up of children in PreK districts who were eligible for the PreK program but were not enrolled; and (3) an other-district control group, made up of children selected on the PreK eligibility criteria in districts not participating in the PreK program. The first two groups had also been tested on the three instruments in the fall and again in the spring of the previous school year.

Analyses of covariance were carried out for each measure for the fall kindergarten testing and again for the spring kindergarten testing. In each set of analyses, the three groups were compared on the criterion measure, with control for the child's age and the mother's educational level. A second set of analyses was carried out in which the experimental group was compared only with the waiting-list control group. In these analyses, the PreK pretest and family income were added as control variables; these variables were not available for the other-district control group, thus eliminating that group from the analyses.

WAVE I RESULTS: BEGINNING OF KINDERGARTEN

Walker Readiness Test

Results of the analyses of Walker scores obtained by children at the beginning of kindergarten are summarized in Table 1 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Walker scores at the beginning of kindergarten while controlling for possible effects of child's age and mother's education.

Both age and mother's education were significantly related to Walker scores. No difference was found between the experimental group and the waiting-list control group. When comparing the experimental group with the other-district control group, an interaction was found between mother's education and the effect of the program, indicating that the effect of the program on a child depended on the level of his or her mother's education: Among children whose mothers had the least education or middle levels of education, the experimental group scored higher than the other-district control group; the difference was smaller or nonexistent among children whose mothers had the highest levels of education. These relationships were found at all different age levels. The interaction is illustrated in Figure 1.

Analysis using two groups. Two additional variables appeared to have potential for describing more accurately the effect of prekindergarten on children's performance on the Walker at the beginning of kindergarten: scores on the prekindergarten pretest and family income. However, neither of these variables was obtained for the other-district control group, resulting in the elimination of that group from analyses using pretest scores and family income as covariates.

Table 1
Differences Between the Experimental Group and Two Control Groups on the Walker Readiness Test at the Beginning of Kindergarten

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
Analysis using three groups		
EXP vs. WLCON (1531) (60)	0.0	.5
EXP vs. ODCON (1531) (325)	1.9**	#

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for: Pretest & MOED	Pretest & income	Pretest & age
Analysis using two groups				
EXP vs. WLCON (839) (39)	1.0	2.9**	#	2.8**

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

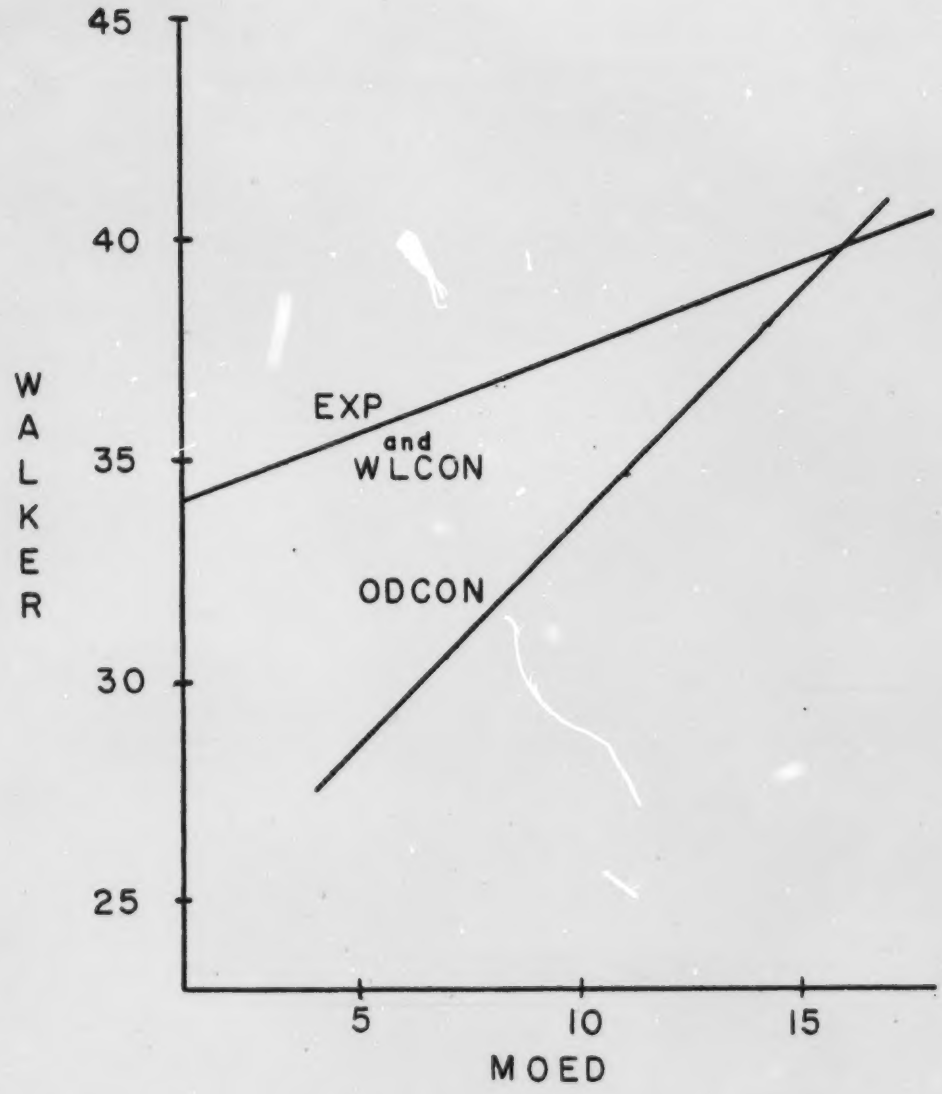

Figure 1. Relationship between level of mother's education and Walker scores at the beginning of kindergarten, assuming an age of 5 years, 6 months. (EXP = experimental group; WLCON = waiting-list control group; ODCON = other-district control group; MOED = mother's education in years of schooling.)

Four variables were used as covariates in the two-group analysis: (1) mother's education; (2) family income; (3) child's age; and (4) Walker prekindergarten pretest scores. Three separate analyses, each of which included two covariates, were performed. Prekindergarten pretest score was used as a covariate in all of the analyses and in each of the analyses was paired with one of the other three covariates.

When the Walker prekindergarten test score was paired with mother's education as covariates, both were found to have a linear relationship with the Walker at beginning of kindergarten. When both of these variables were controlled for, a treatment effect of 2.9 points was found in favor of the experimental group over the control group. This effect was constant at all levels of mother's education and at all levels of the PreK pretest.

When family income and the Walker prekindergarten pretest score were used together as covariates, family income was found to have no effect on Walker scores at the beginning of kindergarten. Therefore, family income was dropped as a covariate, leaving PreK pretest as the sole control variable. An interaction between the treatment and the PreK pretest was found and is illustrated in Figure 2. The treatment effect varies from about seven points in favor of the experimental group at low pretest scores to no difference at higher pretest scores.

When child's age and prekindergarten pretest score were used as covariates, both had an effect on Walker scores at the beginning of kindergarten. A significant difference was found between the experimental group and the waiting-list control group in the presence of these two covariates. The experimental group scored 2.8 points higher than the control group on the Walker at the beginning

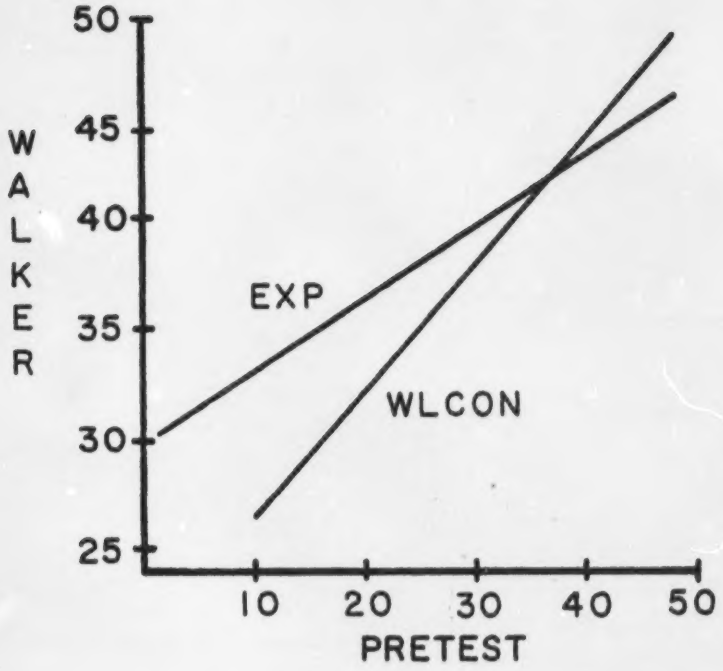

Figure 2. Relationship between Walker scores at the beginning of prekindergarten (PRETEST) and at the beginning of kindergarten. (EXP = experimental group; WLCON = waiting-list control group.)

of kindergarten when the ages of the children and their prekindergarten pretest scores were taken into consideration.

These results provide evidence that the Experimental Prekindergarten Program has a positive effect on children's cognitive development, as measured by the Walker. The analysis using three groups suggests that the program is most effective with children whose mothers had the least education, although the analysis using two groups failed to support this finding.

Cooperative Preschool Inventory

Results of the analyses of Cooperative scores obtained by children at the beginning of kindergarten are summarized in Table 2 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Cooperative scores at the beginning of kindergarten while controlling for possible effects of child's age and mother's education.

Both age and mother's education were significantly related to Cooperative scores and affected the three groups in the same way. Significant differences were found between the three groups while controlling for age and mother's education. It was found that the experimental group scored 1.2 points higher than the other-district control group on the Cooperative but scored 2.3 points lower than the waiting-list control group.

Analysis using two groups. The results obtained with two covariates indicated the desirability of examining more thoroughly prekindergarten effects on the Cooperative at the time the children enter kindergarten. This could be done by adding the control variables, prekindergarten pretest scores and family income. Comparisons were then made between the experimental group and the waiting-list control group.

Table 2
Differences Between the Experimental Group and Two Control Groups on the Cooperative Preschool Inventory at the Beginning of Kindergarten

Analysis using three groups		
Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
EXP vs. WLCON (1527) (60)	-3.3**	-2.3*
EXP vs. ODCON (1527) (328)	.1	1.2*

Analysis using two groups				
		Differences between groups when controlling for:		
Groups being compared (n in parentheses)	Differences between group means	Pretest & MOED	Pretest & income	Pretest & age
EXP vs. WLCON (849) (39)	-1.9	#	#	-.5

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

The analysis was similar to the two-group analysis of Walker scores. Four variables were used as covariates: (1) mother's education; (2) family income; (3) child's age: and (4) Cooperative prekindergarten pretest scores. The prekindergarten pretest score was paired with one of the other three variables in each of three analyses.

When the Cooperative prekindergarten pretest and mother's education were used simultaneously as covariates, both showed interactions with the treatment. These effects are shown in Figure 3. The different separation of the lines at different points shows that the prekindergarten treatment affected children with different pretest scores in different ways; the different intersections of the line when mother's education varied indicates that the treatment effect also depended on the level of mother's education. At the time children enter kindergarten, the prekindergarten program had the greatest positive effect on Cooperative scores of children who scored highest on the pretest and whose mothers had the least education; among children who scored low on the pretest and whose mothers had more education, the control group exceeded the experimental group.

When the Cooperative prekindergarten pretest and family income were used simultaneously as covariates, an interaction of both variables with the treatment was found. The interaction, which is shown in Figure 4, indicates that the experimental group exceeded the waiting-list control group at combinations of low income level and high pretest level. It appears that, for the children studied here, the prekindergarten had a positive effect on children who came from families with the lowest income and who scored high on the Cooperative prekindergarten pretest.

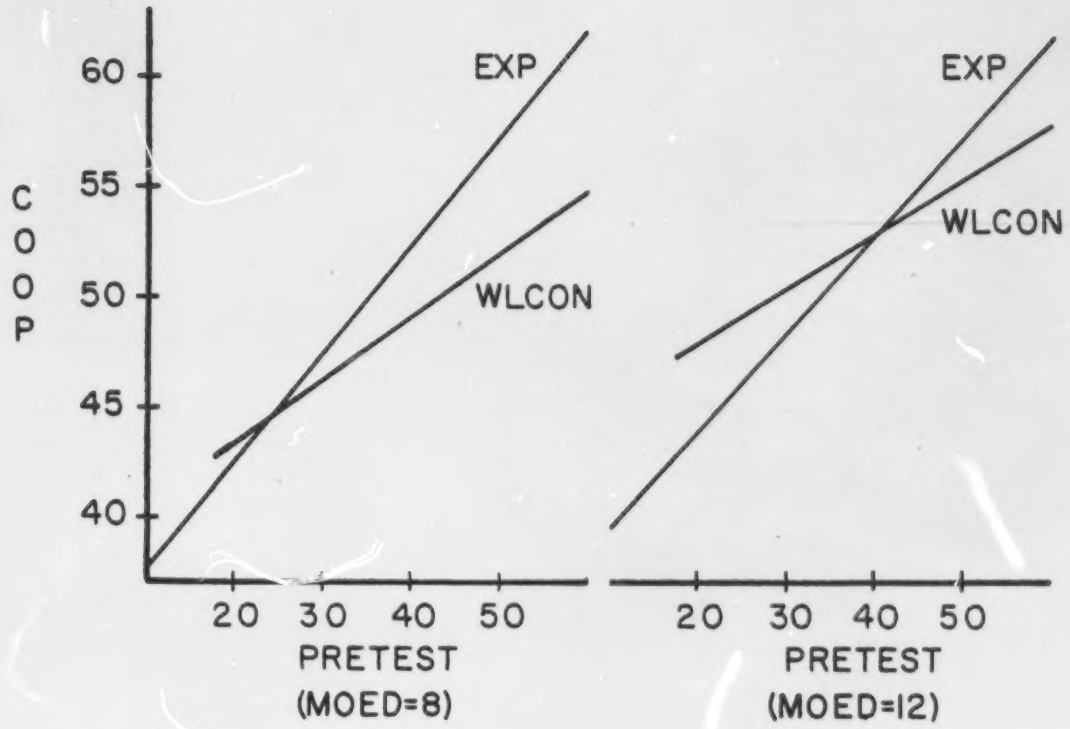

Figure 3. Relationship between Cooperative scores at the beginning of prekindergarten (PRETEST) and at the beginning of kindergarten (COOP) at two levels of mother's education. (EXP = experimental group; WLCON = waiting-list control group; MOED = mother's education in years of schooling.)

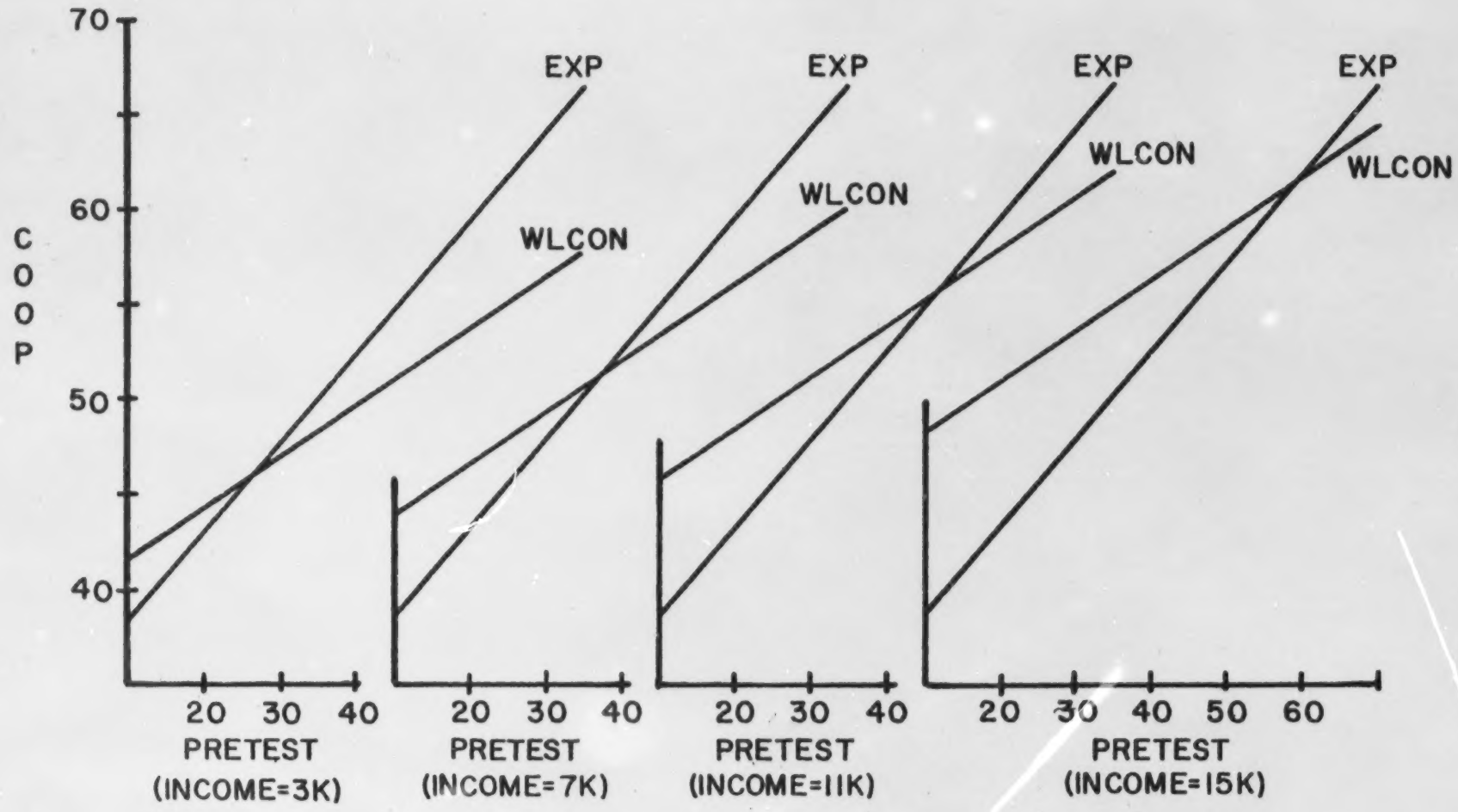

Figure 4. Relationship between Cooperative scores at the beginning of prekindergarten (PRETEST) and at the beginning of kindergarten (COOP) at four levels of family income. (EXP = experimental group; WLCON = waiting-list control group.)

When age was paired with the Cooperative prekindergarten pretest as a covariate, age did not contribute a significant amount of additional information and therefore was not needed in the analysis; no difference was found between groups on the Cooperative at the time the children entered kindergarten with control for the pretest.

Peabody Picture Vocabulary Test

Results of the analyses of Peabody scores obtained by children at the beginning of kindergarten are summarized in Table 3 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Peabody scores at the beginning of kindergarten while controlling for possible effects of child's age and mother's education.

The analysis showed that both age and mother's education were significantly related to Peabody scores and affected the three groups in the same way. However, even with control for differences among the groups in age and mother's education, no significant differences were found among the groups on Peabody scores at the beginning of kindergarten.

Analysis using two groups. Possible effects of the prekindergarten program on Peabody scores at the beginning of kindergarten were also examined in the presence of prekindergarten pretest scores and family income. The analysis followed the pattern used in examining Walker and Cooperative data. Comparisons were made between the experimental group and the waiting-list control group on Peabody scores at the beginning of kindergarten while controlling for possible effects of four variables: (1) mother's education; (2) family income; (3) child's

Table 3
Differences Between the Experimental Group and Two Control Groups on the Peabody Picture Vocabulary Test at the Beginning of Kindergarten

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
Analysis using three groups		
EXP vs. WLCON (1529) (59)	-5.4**	-3.2
EXP vs. ODCON (1529) (327)	-2.0**	.3

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for: Pretest & MOED	Pretest & income	Pretest & age
Analysis using two groups				
EXP vs. WLCON (456) (25)	-3.3*	.4	.4	.4

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

age; and (4) Peabody prekindergarten pretest scores. The prekindergarten pretest score was used as a covariate in conjunction with one of other three variables in each of three analyses.

None of the three covariates (mother's education, family income, or age) added a statistically significant amount of information when paired with the pretest score. Although the waiting-list control group scored higher than the experimental group on the Peabody, the difference disappeared when PreK pretest scores were considered. These results thus failed to show a difference between the experimental group and the waiting-list control group at the time the children entered kindergarten.

WAVE I RESULTS: END OF KINDERGARTEN

Walker Readiness Test

Results of the analyses of Walker scores obtained by children at the end of kindergarten are summarized in Table 4 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Walker scores at the end of kindergarten while controlling for possible effects of child's age and mother's education.

Both age and mother's education were found to be related to the Walker at the end of kindergarten. Age had a simple effect; children scored about one point (.94) higher on the Walker for every additional 100 days of age, regardless of the level of mother's education. The regression slopes for mother's education on Walker scores for the three groups were not parallel, however. In testing to determine where the difference lay, it was found that the slopes

Table 4
Differences Between the Experimental Group and Two Control Groups on the Walker Readiness Test at the End of Kindergarten

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
Analysis using three groups		
EXP vs. WLCON (1414) (58)	- .3	.1
EXP vs. ODCON (1414) (301)	1.0*	#

Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for: Pretest & MOED	Pretest & income	Pretest & age
Analysis using two groups				
EXP vs. WLCON (786) (38)	.5	1.7*	2.1*	1.8*

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

for the experimental group and waiting-list control group were parallel and did not differ significantly, while the slopes for the experimental group and the other-district control group were not parallel. These results are illustrated in Figure 5. The difference in slopes indicates that the effect of the prekindergarten program was greater for children whose mothers had the least education. For example, among children whose mothers had eight years of schooling, the experimental group (and waiting-list control group) scored about four points higher on the Walker than the other-district control group; among children whose mothers had twelve years of education, the experimental group scored only about one and one-half points higher.

Analysis using two groups. The addition of the Walker prekindergarten pretest and family income as covariates made it possible to examine more precisely effects of the PreK program on children's performance on the Walker at the end of kindergarten, although it eliminated the other-district control group from the analyses. Three separate analyses were performed, with the Walker prekindergarten pretest paired with one of the other three covariates—mother's education, family income, or child's age—in each analysis.

When mother's education and the Walker prekindergarten pretest were used together as covariates, mother's education was found to have no effect on Walker scores at the end of kindergarten and was dropped from the analysis. With the pretest as a control variable, the experimental group scored 1.7 points higher than the waiting-list control group on the Walker at the end of kindergarten. When income and pretest were used together as covariates, the difference between groups was increased to 2.1 points. When age and pretest were used as covariates, the difference was 1.8 points. Each of these differences is significant at the .05 level.

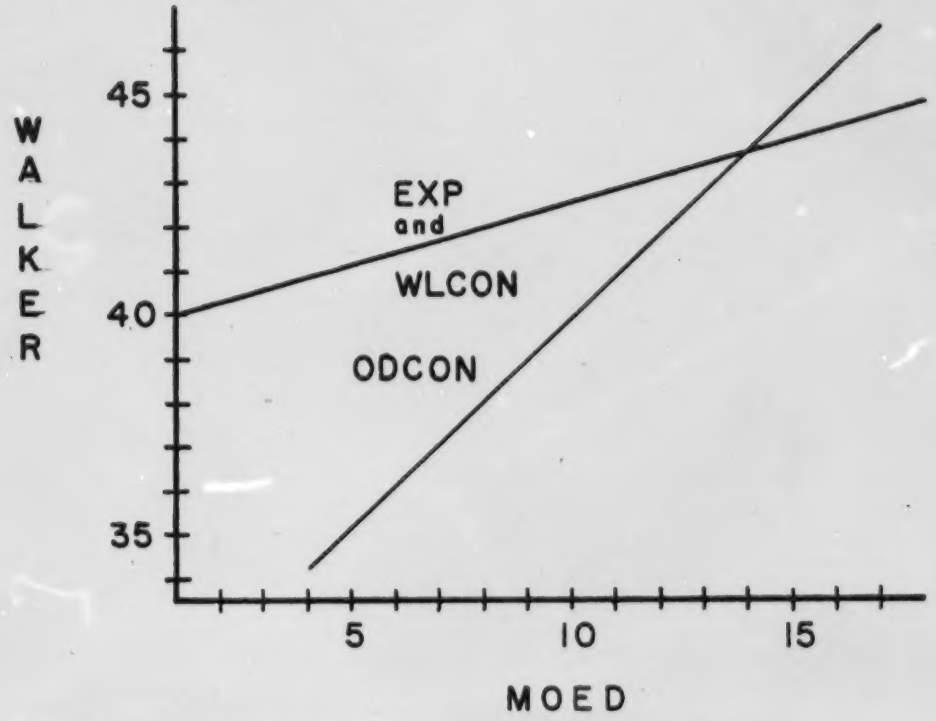

Figure 5. Relationship between level of mother's education and Walker scores at the end of kindergarten, assuming an age of 6 years, 0 months. (EXP = experimental group; WLCON = waiting-list control group; ODCON = other-district control group; MOED = mother's education in years of schooling.)

Cooperative Preschool Inventory

Results of the analyses of Cooperative scores obtained by children at the end of kindergarten are summarized in Table 5 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Cooperative scores at the end of kindergarten while controlling for possible effects of child's age and mother's education.

Both age and mother's education were significantly related to the Cooperative administered at the end of kindergarten. However, even with control for age and mother's education, differences between the groups were not statistically significant.

Analysis using two groups. Cooperative prekindergarten pretest scores were paired with mother's education, family income, and child's age, respectively, as covariates. None of the three additional variables was found to be significantly related to the Cooperative administered at the end of kindergarten in the presence of the pretest. A common analysis of covariance was then carried out with the Cooperative pretest as the lone covariate. A nonsignificant difference of .6 points was found between the experimental group and the waiting-list control group.

Peabody Picture Vocabulary Test

Results of the analysis of Peabody scores obtained by children at the end of kindergarten are summarized in Table 6 and discussed below.

Analysis using three groups. The experimental group was compared to the waiting-list control group and the other-district control group on Peabody

Table 5
Differences Between the Experimental Group and Two Control Groups on the Cooperative Preschool Inventory at the End of Kindergarten

Analysis using three groups		
Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
EXP vs. WLCON (1420) (59)	-1.1	- .4
EXP vs. ODCON (1420) (302)	- .7	.2

Analysis using two groups				
		Differences between groups when controlling for:		
Groups being compared (n in parentheses)	Differences between group means	Pretest & MOED	Pretest & income	Pretest & age
EXP vs. WLCON (793) (38)	- .3	.6	.6	.6

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

Table 6
Differences Between the Experimental Group and Two Control Groups on the Peabody Picture Vocabulary Test at the End of Kindergarten

Analysis using three groups		
Groups being compared (n in parentheses)	Differences between group means	Differences between groups when controlling for MOED and age
EXP vs. WLCON (706) (28)	-5.8**	-3.9
EXP vs. ODCON (706) (146)	-3.6**	-1.3

Analysis using two groups				
		Differences between groups when controlling for:		
Groups being compared (n in parentheses)	Differences between group means	Pretest & MOED	Pretest & income	Pretest & age
EXP vs. WLCON (433) (25)	-3.1**	-.4	+.2	-.4

Note. Abbreviations:
EXP = Experimental group.
WLCON = Waiting-list control group.
ODCON = Other-district control group.
MOED = Mother's education in years of schooling.

#An interaction effect was found between the treatment and one or more control variables.

*$p < .05$, **$p < .01$.

scores at the end of kindergarten while controlling for possible effects of child's age and mother's education.

The analysis showed that both age and mother's education were significantly related to Peabody scores and affected the three groups in the same way. However, even with control for differences among the groups in age and mother's education, no significant differences were found among the groups on Peabody scores at the end of kindergarten.

Analysis using two groups. The Peabody prekindergarten pretest score was used as a covariate in conjunction with one of other three variables in each of three analyses. Age and mother's education were found not to be significantly related to the Peabody administered at the end of kindergarten. An analysis of covariance was carried out with the pretest as a single covariate. No statistically significant difference was found between the two groups.

When income and pretest were used together as covariates, income was found to be significantly related to Peabody scores at the end of kindergarten, but the two groups were not found to be significantly different.

The relationship between the pretest and the Peabody administered at the end of kindergarten was tested for curvilinearity. Third degree curvilinearity was found, but the difference between the two groups was not significant (Figure 6).

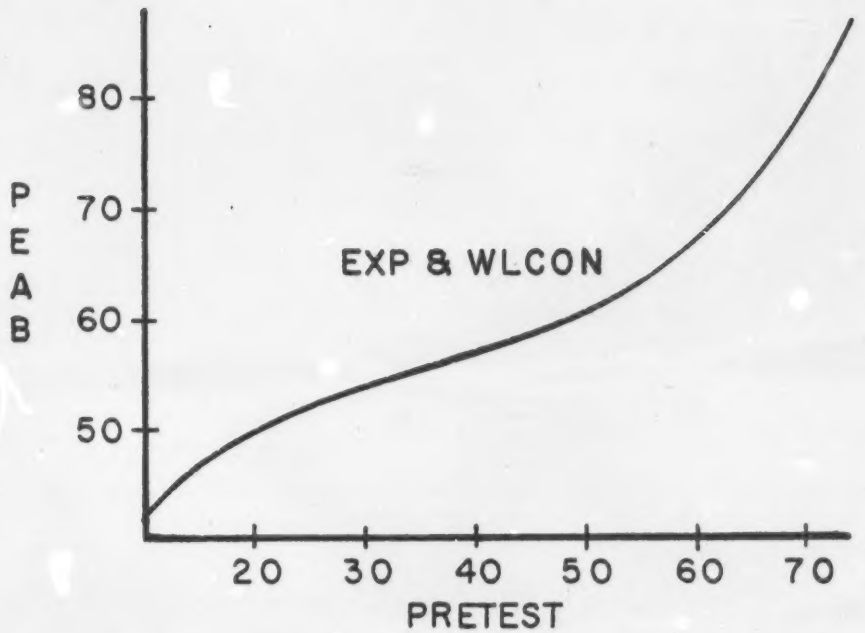

Figure 6. Relationship between Peabody scores at the beginning of prekindergarten (PRETEST) and at the end of kindergarten (PEAB). (EXP = experimental group; WLCON = waiting-list control group.)

WAVE II RESULTS

Analysis to determine effects of the prekindergarten program on children in Wave II followed an analysis of covariance procedure, with elaborations which allowed for curvilinearity. In the traditional analysis of covariance, it is assumed that the effect of the covariate is linear. The procedure followed in this analysis took into account curvilinearity with one or two bends and then tested hypotheses to determine whether the curvilinearity is necessary to describe the relationships.

The criterion measures were the Walker Readiness Test, the Cooperative Preschool Inventory, and the Peabody Picture Vocabulary Test administered near the end of the prekindergarten year. For the analysis of each criterion variable, five control variables were used: (1) time between pretesting and posttesting; (2) mother's education; (3) child's age; (4) family income; and (5) pretest score.

The experimental group contained about 1500 children and the waiting-list control group contained 48 children.

Walker Readiness Test

On the Walker posttest, the experimental group scored 2.2 points higher than the waiting-list control group. This difference is significant at the .05 level. Each of the five control variables was tested to see how it affected Walker posttest scores.

Time between testing as a control variable. The average time between the Walker pretest and posttest was 213 days for the experimental group, with a standard deviation of 27 days, and 166 days for the waiting-list control group,

with a standard deviation of 39 days. The difference seems large enough to be important since it gives the experimental group 47 more days of experience and maturation than the control group between pretest and posttest. However, when this difference was tested for its impact on the Walker posttest, it was found to have no effect. The correlation between time between tests and Walker posttest scores was not statistically significant.

Mother's education as a control variable. Mother's education was related to Walker posttest scores in a curvilinear manner, as shown in Figure 7. The difference between the curves for the experimental group and the waiting-list control group is the same at all levels of mother's education. However, below eight years of mother's education, the relationship to Walker posttest scores is negative; above eight years, the relationship is positive. In general, for each additional year of mother's education beyond 10 years, children scored approximately one-half point higher on the Walker posttest. With mother's education accounted for, the difference between the experimental group and the waiting-list control group is about 2.3 points on the Walker posttest. This indicates that for children whose mothers had the same level of education, the children in the experimental group scored about 2.3 points higher than the control group. Thus, when the higher level of mother's education of children in the control group is considered, the impact of the prekindergarten program is slightly greater than indicated by the simple difference between the two groups on the posttest.

Age as a control variable. Age was linearly related to Walker posttest scores at the .0001 level of significance and was therefore retained as a control variable. Older children tended to score higher; for each additional

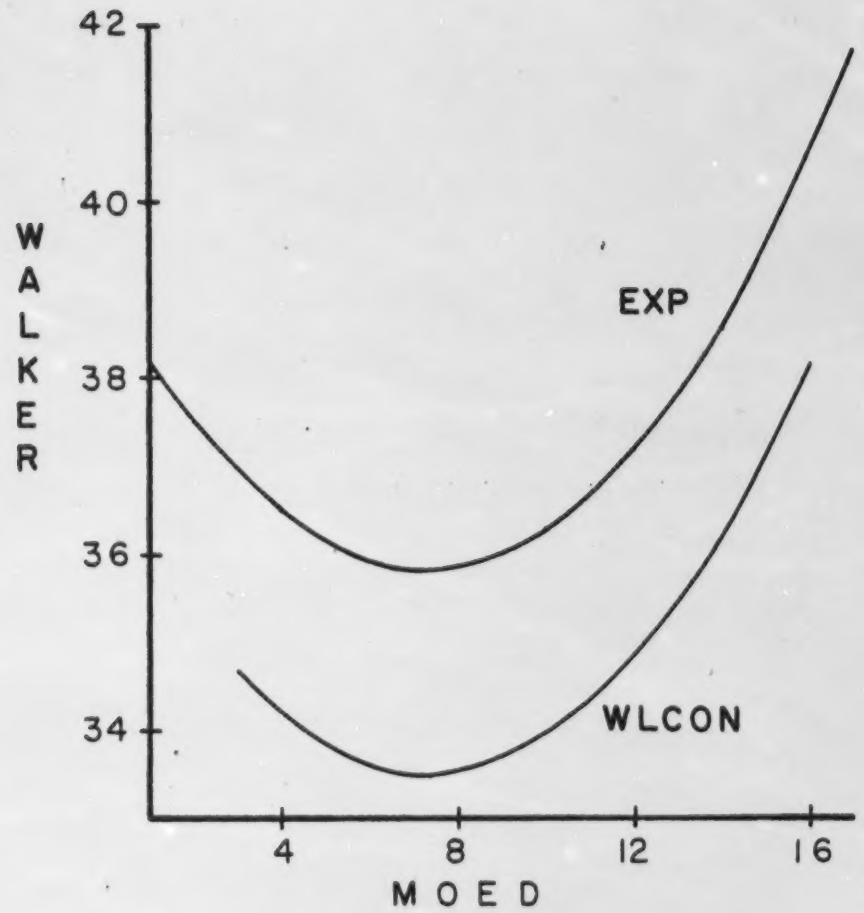

Figure 7. Relationship between level of mother's education and Walker scores at the end of prekindergarten. (EXP = experimental group; WLCON = waiting-list control group; MOED = mother's education in years of schooling.)

year of age, children scored about 1.4 points higher on the Walker. When an analysis of covariance was performed, the difference between the experimental group and the waiting-list control group at a given age level was about 2.7 points on the Walker. This difference is significant at the .017 level.

Income as a control variable. Family income did not correlate significantly with the Walker posttest and was therefore dropped as a control in this analysis.

Walker pretest score as a control variable. The waiting-list control group scored about 2.5 points higher than the experimental group on the Walker pretest. It appeared that controlling for this initial advantage of the control group would provide a truer picture of effect of the prekindergarten program on Walker posttest scores. Correlations between pretest scores and posttest scores on the Walker were high, .54 for the experimental group and .67 for the waiting-list control group. The relationships were linear. When an analysis of covariance was performed with Walker pretest scores as a control variable, it was found that, among children scoring at the same level on the pretest, children in the experimental group scored 3.4 points higher on the Walker posttest than children in the waiting-list control group. This difference was significant at the .0005 level.

Conclusions. The experimental group scored higher on the Walker posttest than the waiting-list control group. The difference between the two groups was increased by taking into account mother's education, the child's age, and the Walker pretest score. The results presented here provide evidence that the Experimental Prekindergarten Program has a positive effect on the cognitive development of children while they are in the program.

Cooperative Preschool Inventory

On the Cooperative posttest, the experimental group scored .72 points higher than the waiting-list control group. This difference is not statistically significant. However, the two groups differed somewhat on a number of variables which might affect their performance. Therefore, analysis of covariance was used to study prekindergarten effects while controlling for other possible influences. It was found that most of the control variables had no effect on the original findings: however, when performance on the pretest was considered, the experimental group scored significantly higher than the waiting-list control group on the Cooperative posttest. The analyses of covariance are described below.

Time between testing as a control variable. The experimental group had 43 more days between pretesting and posttesting than the waiting-list control group. The relationship between this variable and the posttest was found to be curvilinear with one bend (Figure 8), and the same for both groups. It was not strong enough to produce any separation between the groups. Thus the finding of no significant difference between means on the posttest was not changed by consideration of time between testing. It appears from Figure 8 that only after about 180 days does the elapsed time between testing begin to have an effect on Cooperative posttest scores.

Mother's education and child's age as control variables. Each of these control variables correlated significantly with Cooperative posttest scores; the relationship was the same for both the experimental group and the waiting-list control group in each case. However, no difference was found between the groups on the Cooperative posttest in the presence of any of these three control variables.

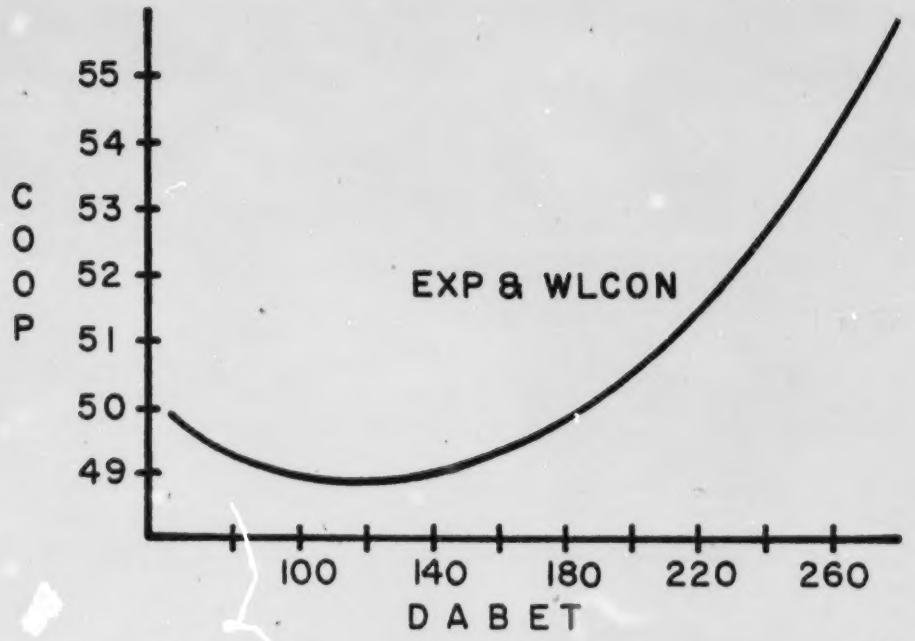

Figure 8. Relationship of time between testing with Cooperative scores at the end of prekindergarten (COOP). (EXP = experimental group; WLCON = waiting-list control group; DABET = the number of calendar days between pretest and posttest.)

Family income as a control variable. The control group had about $2500 more in annual family income than the experimental group, a phenomenon which could affect posttest scores, given any correlation between income and the posttest. Family income did in fact have a significant curvilinear relationship with the posttest. The relationship was not the same for the control group and the experimental group. Figure 9 shows the relationship for the two groups. The effect of the treatment depends upon the level of income. At lower and upper levels of income, the experimental group exceeds the control group; at middle levels of income, there is little or no difference between the groups on the Cooperative posttest.

Cooperative pretest score as a control variable. The control group scored 5.7 points higher on the pretest than the experimental group. A significant curvilinear relationship was found between pretest and posttest. When the pretest was used as a control variable, a difference of 3.5 points was found between the experimental group and the waiting-list control group on the Cooperative posttest. The difference favored the experimental group and was significant at the .0002 level. This indicates that among children scoring at the same level on the pretest, the experimental group scored 3.5 points higher than the control group on the posttest. Figure 10 shows the relation of the two groups.

Peabody Picture Vocabulary Test

On the Peabody posttest, the experimental group scored about a half point below the waiting-list control group. This difference is not significant. In order to take into account other differences between the two groups which might

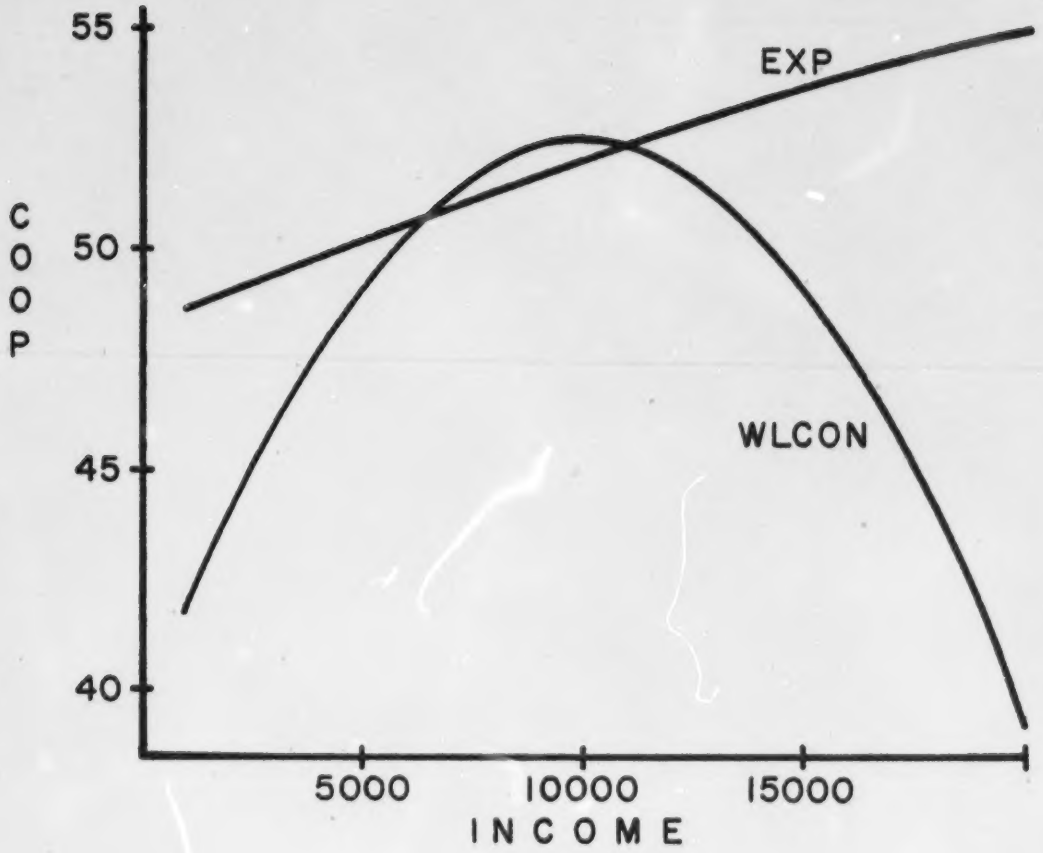

Figure 9. Relationship between family income and Cooperative scores at the end of prekindergarten (COOP). (EXP = experimental group; WLCON = waiting-list control group.)

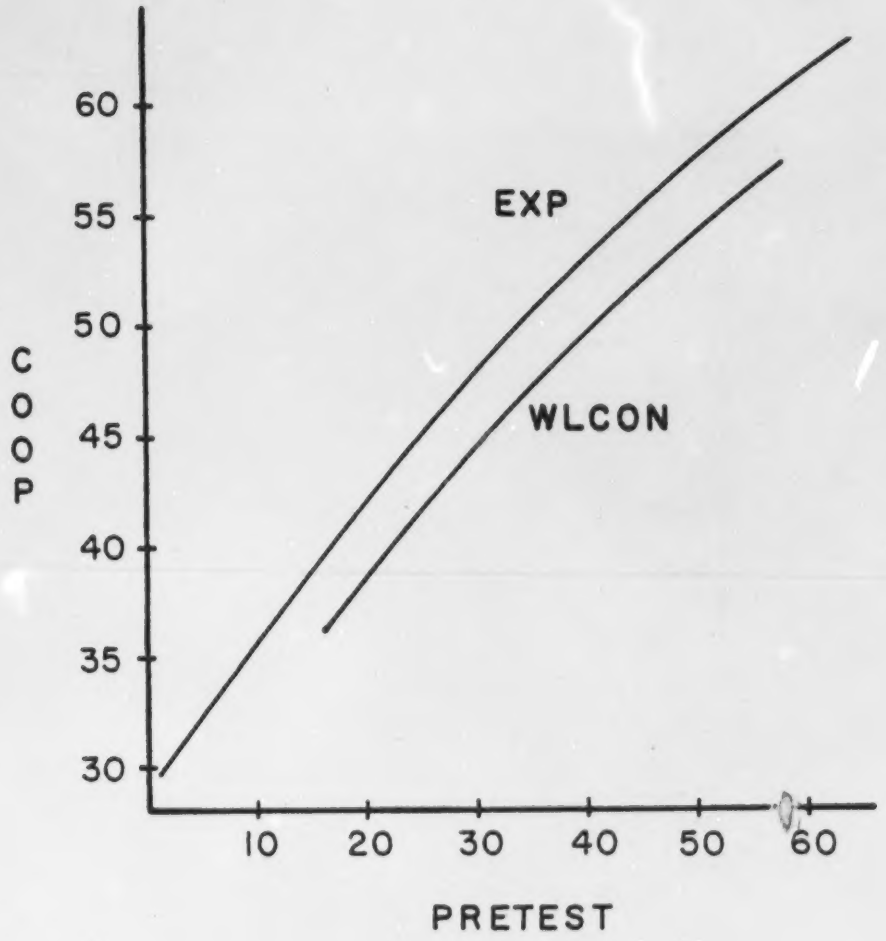

Figure 10. Relationship between Cooperative scores at the beginning of prekindergarten (PRETEST) and at the end of prekindergarten (COOP). (EXP = experimental group; WLCON = waiting-list control group.)

affect their performance on the Peabody, analyses of covariance were performed using the five control variables. It was found that: (1) the amount of time between the pretest and posttest interacted with the prekindergarten treatment; and (2) when pretest scores were considered, the experimental group scored significantly higher than the control group on the Peabody posttest.

Time between testing as a control variable. The average time between the pretest and posttest was 210 days for the experimental group and 167 days for the waiting-list control group. Time between testing was found to relate to Peabody posttest scores, but the relationships were different for the two groups. Figure 11 shows the relationships which are curvilinear. The difference between the slopes indicates that the effect of prekindergarten on Peabody scores depends on the amount of time between testing. With relatively few days between testing (for example 100 to 140 days), the experimental group scored higher than the control group. When the number of days between testing reached 170, the opposite was true: The waiting-list control group scored higher than the experimental group.

Mother's education, child's age, and family income as control variables. Although each of these variables was found to relate to Peabody posttest scores, there was no effect on the difference between the groups on the Peabody; no difference was found between the groups on the Peabody posttest in the presence of any of these three control variables.

Peabody pretest scores as a control variable. The waiting-list control group scored approximately six points higher than the experimental group on the Peabody pretest. This difference suggested the advisability of controlling for pretest performance in order to obtain a truer picture of the effects of the prekindergarten program on the Peabody posttest.

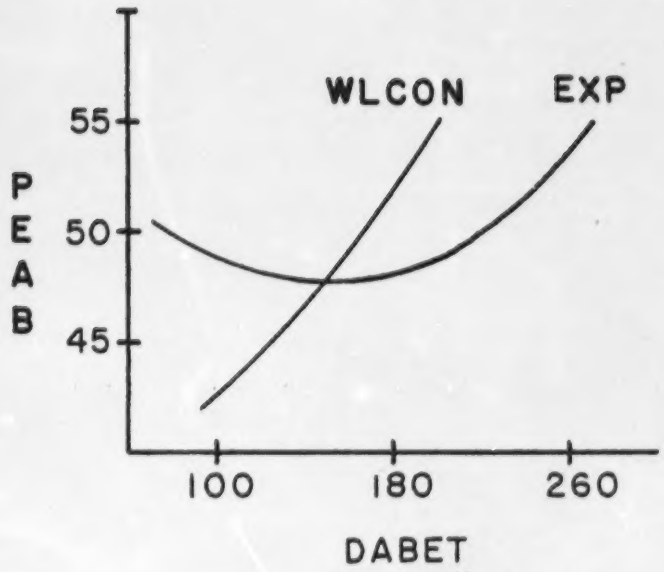

Figure 11. Relationship of time between testing with Peabody scores at the end of prekindergarten (PEAB). (EXP = experimental group; WLCON = waiting-list control group; DABET = the number of calendar days between pretest and posttest.)

The Peabody pretest was found to have a curvilinear correlation of .72 with the posttest. The relationship is illustrated in Figure 12. When the pretest was used as a control variable in analysis of covariance, the experimental group scored 3.1 points higher on the posttest than the waiting-list control group. This difference is significant at the .01 level. This indicates that among children scoring at the same level on the pretest, the experimental group scored 3.1 points higher than the control group on the Peabody posttest.

Conclusions. Although the simple difference between the experimental group and the waiting-list control group on the Peabody posttest was not significant, when the initial advantage of the control group on the pretest was considered, the experimental group scored significantly higher than the control group. This is evidence that the Experimental Prekindergarten Program has a positive effect on the cognitive development of children while they are in the program.

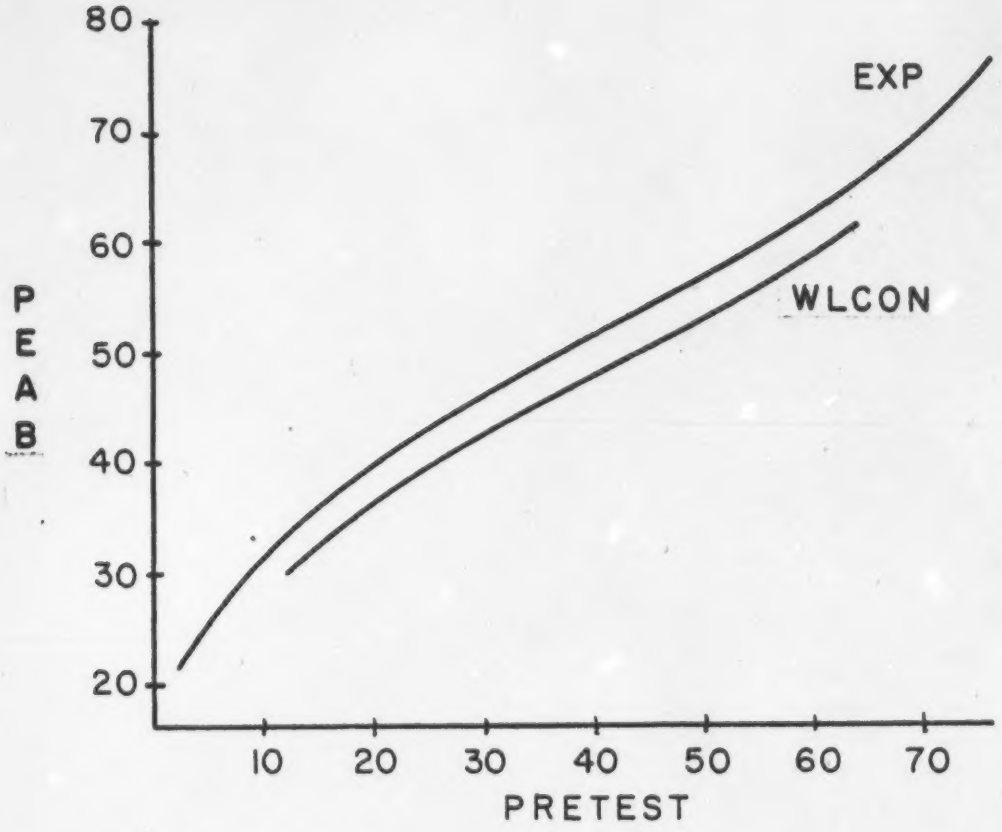

Figure 12. Relationship between Peabody scores at the beginning of prekindergarten (PRETEST) and at the end of prekindergarten (PEAB). (EXP = experimental group; WLCON = waiting-list control group.)

THE INDEPTH STUDY

The Indepth Study component of the Evaluation Plan involves seven of the fifty-one districts administering State Experimental Prekindergarten Programs. It focuses on an assessment of program quality and on continuity of experience through the study and documentation of individual children's growth and development, prekindergarten through grade three. Consistent with the concept of program evaluation as a cyclical process which cannot be separated from planning, implementing and refining, the Indepth Study institutes processes and structures which enhance, as well as document, the educational experiences offered young children. Specific support for this purpose, provided through the Bureau of Child Development and Parent Education, include: consultative assistance from the staff of the Bureau and from Patricia Carini*; services of a Field Coordinator, and intensive assistance from auxiliary consultants assigned to each district.

In recognition of the classroom teacher as key to program planning, implementation and assessment, services were provided to support the development and improvement of teacher skills in observing and recording individual children's growth. The specific procedure was for each teacher to observe, record and collect the work of a single "study child", not necessarily a "problem" child, as a means of gaining greater insight into individual learning styles and leading to increased generalized knowledge of all children. During

---

*Patricia Carini is Director of Research and Adult Education, Prospect School, North Bennington, Vermont and is on the staff of Leslie College, Boston, Massachusetts.

the first year of the Study, kindergarten teachers who would be receiving children from the prekindergarten the following year were introduced to this procedure through large and small group meetings, demonstrations and classroom contacts. Inservice activities in the classroom, consisting of supportive observation and recording followed by discussion of the running records, were found to be most effective in overcoming negative or disinterested reactions. The gradual involvement of building principals and ancillary staff broadened the scope and enhanced the value of what might have been viewed as an externally imposed task.

Following the Study's plan to involve teachers at the next grade level each succeeding year, first grade teachers were introduced to the process late in the first year and during the second year became actively involved with kindergarten teachers. The rate at which new teachers were involved, the extent and quality of involvement and the total number of participants vary among and within the districts from one year to another. The requirement of the Study is that, from each of two waves of prekindergarten children, three Study children will be followed by comprehensive and systematic collection of data, prekindergarten through the third grade, or through second grade in the case of Wave II. Most districts have encouraged participation of all interested teachers. In one district, a local goal for universal participation is proving feasible through the incorporation of documentation processes into the fabric of the entire system and through support at every administrative level.

Participation of staff other than teachers, as well as the inclusion of teachers from more than one grade level, has led to the development of teams

which give increased purpose to the collection of data, and has provided significant impetus to the documentation effort. The processes which give structure to the team activities include: Staff Review, in which the focus is on the child as "learner" and on the school's provision for his independent learning; Reflection on a Medium, considering potential of the medium to promote thought and learning, followed by study of samples of a child's work in that medium; Reflection on a Word or Phrase frequently repeated in the child's record; Reflection on an Issue such as "discipline" or "grouping"; and analysis of collected data to identify emerging patterns of growth which are summarized annually to form the basis of the five-year document of a child's educational experience and development. Most of the processes were introduced during the first two years of the Study. Staff Review is a regularly scheduled activity in all of the districts. Use of other processes varies in extent and depth. In all districts, the degree to which processes have been established has significantly affected the richness of documentary material available for the Study children. In addition, teachers have found stimulation in interaction with other staff members and encouragement in the recognition of their professionalism as data gatherers and program planners. The effects of systematic interaction upon the cohesiveness of staff within a school building are increasingly evident.

At the end of the second year of the Study, a minimum of six children in each of the seven districts serves as a nucleus for teams within the schools. Considerations of data, as well as observation records and collections of children's work, have been organized, reviewed to discover patterns and summarized for transmittal to the next teacher and for use by the support team.

As the processes of collecting and analyzing children's data were instituted and structures such as the internal school teams evolved, need for support structures at the district level became evident. At the beginning of the Study, each district appointed a Liaison to serve as primary contact person and to assist in articulation at the local level. To assure the continuation of documentation activities, each district established a Leadership Team which is chaired by the Liaison and has a membership representative of all staff levels involved in the Study. Through continued refinement of role and provision for direct experiences relating to the documentation processes, Leadership Teams are increasingly able to assume the staff development and articulation functions of the Indepth Study within their districts.

Principals are represented on the Leadership Teams, but, in addition, all principals are recognized as having a key role in assuring district autonomy in the documentation processes and in implementation of change. They serve as links between their internal teams, which relate the processes to individual children and schools, and the Leadership Team, which relates the processes to district structure. To enhance their pivotal function, a project involving ten principals in the documentation of continuity of experience within their schools was begun at the end of the second year of the Study and will provide additional evidence of their contribution to meaningful change.

Preparation of the final documentation of individual children's growth from prekindergarten through grade three is the responsibility of the Bureau Staff, the Field Coordinator and the Auxiliary Consultants. However, teachers, principals and Leadership Team members are participating in some of the

processes which integrate the child's interests, preferred mediums and thematic content of his products as a basis for the final essay, descriptive of the child's development and his school experience. These comprehensive documents will provide evidence of the long-term effectiveness of the Prekindergarten Program and of the continuity provided in succeeding years. Material for the final documents, including copies of all records, samples of children's work and annual essays, are on file in the Bureau. Complete anonymity is preserved through use of children's I.D. numbers as the only means of identification.

Beginning with the second year of the Study, the Field Coordinator and the Bureau Staff have recorded and charted the progress of district internalization of documentation processes critical to the Study and to the maintenance of on-going documentation. Beginning the third year, this record will include the Principals' Study for the documentation of continuity of experience provided by a school. All documentary material will contribute to the final description of the structures and processes in terms of their capacity to facilitate continuity in the child's learning experience, to promote district change toward environments more responsive to children, and to increase the capabilities of local staff to institute and maintain program improvement.

Products of the Indepth Study will have implications not only for the districts involved, but for all educators, change agents, evaluators and policy makers. More importantly, the processes and structure of the Study, if integrated into the school organization, will have significant implications in terms of maintaining change beyond the duration of an experimental study.

SUMMARY AND CONCLUSIONS

The study of Wave I children was continued through kindergarten. Wave II children were studied during the prekindergarten year.

The PreK program had a positive effect on the performance of children on the Walker Readiness Test at the beginning and at the end of kindergarten. The program had the greatest impact on children whose mothers had the least education.

On the Cooperative Preschool Inventory, mixed results were obtained at the beginning of kindergarten. The experimental group exceeded the other-district control group when child's age and mother's education were controlled for, but did not perform as well as the waiting-list control group. Interactions were obtained in analyses pairing PreK pretest scores with mother's education and with family income; the PreK program appeared to have the most impact on children who came from families with low income, whose mothers had the least education, and who scored high on the PreK pretest. No effect of the PreK program was evident in the children's Cooperative scores at the end of kindergarten.

No PreK effects were obtained on the Peabody Picture Vocabulary Test at the beginning or the end of kindergarten.

For Wave II in prekindergarten, the experimental group scored higher on the Walker posttest than the waiting-list control group. The difference between the two groups was increased by taking into account mother's education, child's age, and the Walker pretest score.

On the Cooperative, a positive significant difference was found between the Wave II experimental group and waiting-list control group on the posttest when pretest scores were used as a control variable.

A similar result was obtained in analyzing Peabody scores at the end of prekindergarten.

The evidence from these analyses indicates that the New York State Experimental Prekindergarten Program has a substantial positive impact on the cognitive development of children while they are in the program and that the effect on certain aspects of cognitive functioning (as measured by the Walker Readiness Test) persists at least until the end of kindergarten.

NEXT STEPS

The evidence from the second year of the prekindergarten evaluation study indicates that effects of the prekindergarten program persist beyond the end of prekindergarten. That is, former prekindergarten children perform better on certain measures of development, taken near the beginning and again near the end of kindergarten, than children who have not participated in prekindergarten. The second-year results also indicate that the extent to which prekindergarten affects children's performance on measures administered in kindergarten depends on the children's characteristics, especially their age, family income, the educational level of their mothers, and their scores on the same measures at the time they entered the prekindergarten program.

In order to improve the prekindergarten program and follow-up activities with children after they leave the program, it is important to know how different aspects of the school program affect the children. A beginning in this

direction was made in prekindergarten, as reported in the section summarizing first-year findings, by studying how the amount children were exposed to the prekindergarten program affected the development of social competency (13) and how parents' participation in the program affected their children's scores on the Walker.

Additional analyses of this sort are needed at the prekindergarten level and at succeeding levels as the children move through the primary grades. These analyses will be carried out before and during analyses of the third year's results.

REFERENCES

1. A Plan for Evaluating the New York State Experimental Prekindergarten Programs Under Chapter 46 of the Laws of 1966. Albany, New York: Bureau of Child Development and Parent Education, Bureau of School Programs Evaluation, State Education Department. January 21, 1975.

2. Hick, Thomas L., Susan E. Kukuk, Mary D. Horan, and David J. Irvine. Effects of Prekindergarten on Three Measures of Cognitive Development. Technical Paper #3. Albany, New York: Prekindergarten Evaluation Unit, State Education Department. May 25, 1977.

3. Preliminary Report of Findings: Evaluation of the New York State Experimental Prekindergarten Program. Albany, New York: Prekindergarten Evaluation Unit, State Education Department. June 1977.

4. Hick, Thomas L., Susan E. Kukuk, Mary D. Horan, David J. Irvine, David L. Flint. Effects of Exposure to Prekindergarten on the Development of Social Competency in Children. Technical Paper #5. Albany, New York: Prekindergarten Evaluation Unit, State Education Department. February 24, 1978.

5. Irvine, David J., Mary D. Horan, David L. Flint, Thomas L. Hick, and Susan E. Kukuk. Obtaining Control Groups for Evaluating the New York State Experimental Prekindergarten Program. Technical Paper #4. Albany, New York: Prekindergarten Evaluation Unit, State Education Department. January 16, 1978.

6. Flint, David L., Thomas L. Hick, Mary D. Horan, David J. Irvine, and Susan E. Kukuk. Factor Analysis of Cognitive, Behavioral, Socioeconomic and Related Characteristics of Prekindergarten Children. Technical Paper #6. Albany, New York: Prekindergarten Evaluation Unit, State Education Department. March 16, 1978.

7. Irvine, Horan, Flint, Hick, and Kukuk. Obtaining Control Groups for Evaluating the New York State Experimental Prekindergarten Program, op. cit.

8. Hick, Kukuk, Horan, Irvine, and Flint. Effects of Exposure to Prekindergarten on the Development of Social Competency in Children, op. cit.

9. Flint, Hick, Horan, Irvine, and Kukuk. Factor Analysis of Cognitive, Behavioral, Socioeconomic and Related Characteristics of Prekindergarten Children, op. cit.

10. Hick, Kukuk, Horan, and Irvine. Effects of Prekindergarten on Three Measures of Cognitive Development, op. cit.

11. Hick, Kukuk, Horan, Irvine, and Flint. Effects of Exposure to Prekindergarten on the Development of Social Competency in Children, op. cit.

12. Flint, Hick, Horan, Irvine, and Kukuk. Factor Analysis of Cognitive, Behavioral, Socioeconomic and Related Characteristics of Prekindergarten Children, op. cit.

13. Hick, Kukuk, Horan, Irvine, and Flint. Effects of Exposure to Prekindergarten on the Development of Social Competency in Children, op. cit.